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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/765,094	01/28/2004	Tatsuya Usami	8022-1067	9832

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EXAMINER

WILSON, SCOTT R

ART UNIT PAPER NUMBER

2826

DATE MAILED: 03/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/765,094

Applicant(s)

USAMI, TATSUYA

Examiner

Scott R. Wilson

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 6-16 is/are rejected.
- 7) ☒ Claim(s) 4 and 5 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date: _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>1/28/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 15 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Oda. As to claim 15, Oda, Figure 2G, discloses a semiconductor device comprising: a first insulating layer (11) formed on a substrate (9); a trench (5) formed in said first insulating layer; a conductive layer (14) formed in said trench; and a second insulating layer (4a) and (4b) formed between said first insulating layer (11) and said conductive layer (14), wherein said trench has a part which is wider than the other part, a thickness of said second insulating layer adjacent to said wider part is thicker than the other part. Layers (4a) and (4b) are both formed from the same material (paragraph 0111), and may therefore be considered to form a single layer.

As to claim 16, Oda, Figure 2G, discloses that the trench (5) has a width which is wider at an upper part than a lower part, and a thickness of said second insulating layer (4a) and (4b) adjacent to said upper part is thicker than a thickness of said second insulating layer adjacent to said lower part.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3 and 6-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oda in view of Takase et al.. As to claim 1, Oda, Figure 2G, discloses a semiconductor device comprising: an insulating layer (11) which is formed on a semiconductor substrate (9); a conducting portion (14)(paragraph 0107) which is formed in said insulating layer; and a modified layer (4a) and (4b) which is formed between said insulating layer and said conducting portion. Layers (4a) and (4b) are both formed from the same material (paragraph 0111), and may therefore be considered to form a single layer. Oda does not disclose expressly that the insulating layer includes hydrogenated polysiloxane. Takase et al., Figure 2A, discloses an insulating film (5) formed in a multilayer interconnect structure, comprising an organosiloxane (col. 5, lines 16-18). Organosiloxane is within the scope of being a hydrogenated polysiloxane (see Andrews, p. 2, Summary, "The types of organic modification vary and range from acrylated urethanes, hydrogenated epoxies and modified acrylics...."). At the time of invention, it would have been obvious to a person of ordinary skill in the art to form the insulating layer (11) of Oda with a hydrogenated polysiloxane. The motivation for doing so would have been form an interlayer dielectric with low dielectric constant (Takase et al., col. 1, lines 20-23). Therefore, it would have been obvious to combine Takase et al. with Oda et al. to obtain the invention as specified in claim 1.

As to claim 2, Oda, Figure 2G, discloses that a portion of the modified layer (4a) and (4b) far from said semiconductor substrate (9) is thicker than a portion of said modified layer near said substrate.

As to claim 3, Oda, Figure 2G, discloses that a portion of the conducting region (14) far from the semiconductor substrate is thicker than a portion nearer the semiconductor substrate.

As to claim 6, Oda, Figure 2G, discloses that the conducting portion is a wiring (paragraph 0002), and said modified layer (4a) and (4b) is formed to attach to a side of said wiring.

As to claim 7, Oda, Figure 2G, discloses that a portion of said conducting portion (14) far from said semiconductor substrate is thicker than a portion of said conducting portion near said semiconductor substrate.

As to claim 8, Oda, Figure 2G, discloses that said conducting portion includes a first conducting portion (13) which is the bottom and side part of said conducting portion, and a second conducting portion (14) which is the remaining part of said conducting portion, both made from copper (paragraph 0107).

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As to claims 9-14, the device of Oda in view of Takase et al. would necessarily have to be formed in order to function, so that the method comprising the means of forming the device is inherent in the device structure itself.

Allowable Subject Matter

Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The hydrogenated polysiloxane layer of Takase et al. corresponds to the insulating layer (11) of Oda, not the insulating layer (4a) and (4b) of Oda.

Claim 5 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. No prior art discloses a ladder or porous ladder type hydrogenated polysiloxane.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott R. Wilson whose telephone number is 571-272-1925. The examiner can normally be reached on M-F 8:30 - 4:30 Eastern.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

srw
March 18, 2005

NATHAN J. FLYNN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800